# REPAIR PROCEDURES & GUIDELINES FOR PRESTRESSED/PRECAST CONCRETE BRIDGE UNITS

Defective units or units damaged during handling or storage, must be evaluated by the fabricator and the Iowa Department of Transportation as soon as practical (not to exceed 14 days). The fabricator shall propose repair procedures and list the brand name of patching material and submit his request to the District Materials Engineer (DME). The District Materials Engineer, in consultation with the Office of Materials, will have the final authority to accept, modify, or reject the repair procedure proposed by the fabricator.

The following guidelines provide materials and procedures that may be used for repairs depending upon the extent of the defect or damage:

## GUIDELINES FOR REPAIR OF AREAS WITH EXPOSED PRESTRESSING STRAND, REINFORCING STEELAND SPALLING (STRUCTURAL TYPE)*

These guidelines require the beams with exposed strands that might require repair be thoroughly inspected by Iowa DOT Office of Materials personnel after the forms have been removed, but prior to strand release and detensioning. Prior to any repair, exposed strands shall be neutralized and the beam shall remain on line undetensioned. A repair procedure, along with a proposed mix design and diagram showing the exact location with measurement of affected/exposed areas, shall be submitted for approval by the DME.

The following repair procedure may be used when the hole size does not exceed 50.8 mm(2 in²) and with prior approval of the DME (refer to step 6 for hole size larger than 50.8 mm(2 in²).

1. Remove unsound concrete from the area.

2. Clean/neutralize exposed strands (Strands shall be free of rust, dust, grease, etc.).

3. Place an epoxy-bonding agent on the patch interface.

4. While the bonding material is still tacky, fill the area with a cement mortar.

5. The cement mortar shall consist of (by volume):

   a. One part Type I Portland Cement

   b. Two parts fine aggregate

   c. A solution of two parts water and one part Acryl 60 or approved equal. (Refer to I.M. 491.10.)

   Blend the dry ingredients, and then slowly add the solution of water and Acryl 60 until the mixture is a stiff mortar. Let the mortar stand for fifteen minutes, remix and apply to the patch area.

After the mortar has been placed and finished to the proper shape, cure the patch for twelve hours keeping the patch surface continually and adequately moist. When ambient temperature is below 10°C (50°F), steam curing must be applied for twelve hours.

6. Larger sized holes (larger than 50.8 mm 2 in²) may require a regular concrete mix. A repair procedure, along with a proposed mix design (preferably the same mix used for casting the beams), and a diagram showing the exact location with measurement of the exposed areas, shall be submitted for approval by the DME.

   Step 1, 2, 3, and 4 shall be followed for this type of repair procedure. After the mix has been placed and finished to the proper shape, cure the patch for twelve hours keeping the patch surface moist. When ambient temperature is below 10°C (50°F) a steam-cure shall be applied for a minimum of twelve hours.

## REPAIR AREA WHEN PRESTRESSING STEEL IS NOT EXPOSED (Non-Structural)*

1. Remove unsound concrete.

2. Use an approved rapid-setting concrete patching material as listed in Materials I.M. 491.20, Appendix A.

3. Follow the manufacturer instructions.

Note: Concrete temperature shall be comparable with the patching material.

## REPAIR OF CRACKS USING EPOXY INJECTION

Use an approved epoxy resin as listed in Materials I.M. 491.19, Appendix B. Follow the manufacturer instructions for mixing and injecting the resin into the crack. The repair procedure shall include details of the location of injection ports and the proposed sequence of injecting the resin into the crack through the ports. Follow manufacturer recommendations for curing.

## REPAIR PROCEDURES - CUT OFF STRANDS EXTENSION

Use an approved epoxy-bonding grout that conforms to ASTM C-881 and/or AASHTO M-235 requirements. Follow the manufacturer recommendations and guidelines for preparation and mixing ratio. Prior approval of the DME shall be required.

The following procedures shall be used:

1. Drill 152.4 mm (6 in.) deep hole, 15.875 mm (⅝ in.) in diameter next to the cut-off strand.

2. Clean the hole by washing it and blowing it dry.

3. Fill the hole with two component epoxy-bonding grout use of "Sikadur 32, Hi Mod."

4. Insert the 12.7 mm (½ in.) strand.
5. Allow curing for 24 hours.

6. Bend the strand at the required length from the end of the beam. (Heating and bending of the strand is not allowed.)

* Some repairs may require approved anchoring devices as listed in Office of Materials I.M. 453.09.

Strand Cutoff Length

Strand cutoff length on ends of beams cannot vary by more than ± 12.7mm (1/2”) of the specified length.